



MATH MCS MYP UNIT PLANNER



Teacher(s)	Brown, Hull, Schumacher, McGarrah, Ross, Autry, Duke	Subject group and discipline	Geometry		
Unit title	Unit 4 Circles and Volume	MYP year	5	Unit duration (hrs)	22.5

Inquiry: Establishing the purpose of the unit

Key concept	Related concept(s)	Global context
Relationships	Generalization Measurement Pattern	Orientation in space and time
Statement of inquiry		
Generalizing patterns in the world can lead to recognizing broader relationships.		
Inquiry questions		
<p>Factual—</p> <p>What are the parts of a circle?</p> <p>What are the properties of tangents?</p> <p>What are the properties of chords in a circle?</p> <p>What are the formulas for arc length and sector area?</p> <p>How do we calculate the volume of a solid?</p> <p>What are cross sections?</p> <p>Conceptual—</p> <p>How can we use the properties of chords to solve problems?</p> <p>How is a tangent line related to the radius of a circle at the point of tangency?</p> <p>How can we solve for angles and arcs by intersecting chords, tangents, and secants?</p> <p>How can we solve for segment lengths formed by intersecting chords, tangents, and secants?</p>		

How is the measure of an inscribed angle related to its intercepted arc?

How do cross sections relate to the volume of a solid?

How do we derive the volume formulas of a cylinder, sphere, and pyramid?

Debatable—

How can you use measure and geometric knowledge of circles to design space cities with specific parameters?

MYP Objectives

- MYP Assessment - Rubric B
- MYP Assessment - Rubric C

Assessments

- Sector Area MYP B
- Vocabulary, Area, and Circumference CFA
- Circles Unit 4A Test
- Volume CFA
- Volume MYP C
- Volume Unit 4B Test

Students will use patterns and relationships within circles and 3-D shapes to solve problems.

Approaches to learning (ATL)

- Make inferences and draw conclusions
- Understand and use mathematical notation
- Apply skills and knowledge in unfamiliar situations

Action: Teaching and learning through inquiry

Content Standards

Understand and apply theorems about circles

MGSE9-12.G.C.1 Understand that all circles are similar.

MGSE9-12.G.C.2 Identify and describe relationships among inscribed angles, radii, chords, tangents, and secants. Include the relationship between central, inscribed, and circumscribed angles; inscribed angles on a diameter are right angles; the radius of a circle is perpendicular to the tangent where the radius intersects the circle.

MGSE9-12.G.C.3 Construct the inscribed and circumscribed circles of a triangle, and prove properties of angles for a quadrilateral inscribed in a circle.

MGSE9-12.G.C.4 Construct a tangent line from a point outside a given circle to the circle.

Find arc lengths and areas of sectors of circles

MGSE9-12.G.C.5 Derive using similarity the fact that the length of the arc intercepted by an angle is proportional to the radius, and define the radian measure of the angle as the constant of proportionality; derive the formula for the area of a sector.

Explain volume formulas and use them to solve problems

MGSE9-12.G.GMD.1 Give informal arguments for geometric formulas.

a. Give informal arguments for the formulas of the circumference of a circle and area of a circle using dissection arguments and informal limit arguments.

b. Give informal arguments for the formula of the volume of a cylinder, pyramid, and cone using Cavalieri's principle.

MGSE9-12.G.GMD.2 Give an informal argument using Cavalieri's principle for the formulas for the volume of a sphere and other solid figures.

MGSE9-12.G.GMD.3 Use volume formulas for cylinders, pyramids, cones, and spheres to solve problems.

Visualize relationships between two-dimensional and three-dimensional objects

MGSE9-12.G.GMD.4 Identify the shapes of two-dimensional cross-sections of three dimensional objects, and identify three-dimensional objects generated by rotations of two dimensional objects.

Learning Activities and Experiences

Topic	Resources	Content Covered	Standards
Circles			
Assessments for this Subunit – Quiz, Test			
Lines and Segments with Circles	Guided Notes (from Pearson & Additional Resources)- Circles Vocabulary	<ul style="list-style-type: none"> Unit Vocabulary 	C.1
	10-2 Lines Tangent to a Circle Pearson enVision pg. 427 – 434	<ul style="list-style-type: none"> Identify lines that are tangent to a circle using angle measures and segment lengths. Solve problems involving tangent lines. 	C.2, C.4
	3-Act Task Earth Watch Pearson enVision pg. 435		
	10-3 Chords Pearson enVision pg. 436 – 443	<ul style="list-style-type: none"> Prove and apply relationships between chords, arcs, and central angles. Find lengths of chords given the distance from the center of the circle and use this information to solve problems. 	C.2

	10-5 Secant Lines and Segments Pearson enVision pg. 451 - 458	<ul style="list-style-type: none"> Recognize and apply angle relationships formed by secants and tangents intersecting inside and outside a circle. 	C.2
	Additional Resources: <ul style="list-style-type: none"> Lifting the Rope (DOE) Chords, Secants, and Tangents (DOE Learning & Performance Task) Illustrative Math - <ul style="list-style-type: none"> Mutually Tangent Circles - https://tasks.illustrativemathematics.org/content-standards/tasks/1006 Tangent Line to Two Circles - https://tasks.illustrativemathematics.org/content-standards/tasks/916 Right Triangles Inscribed in a Circle I - https://tasks.illustrativemathematics.org/content-standards/tasks/1091 Right Triangles Inscribed in a Circle II - https://tasks.illustrativemathematics.org/content-standards/tasks/1093 Tangent to a circle from a point - https://tasks.illustrativemathematics.org/content-standards/tasks/1096 		
Angles within/related to Circles	10-4 Inscribed Angles Pearson enVision pg. 444 - 450	<ul style="list-style-type: none"> Identify and apply relationships between the measures of inscribed angles, arcs, and central angles. Identify and apply the relationships between an angle formed by a chord and a tangent to its intercepted arc. 	C.2, C.3
	Additional Resources: <ul style="list-style-type: none"> Circles and their Relationships among Central Angles, Arcs, and Chords (DOE Learning and Applying Task) Investigating Angle Relationships in Circles (DOE Discovery Task) Geometry Problems: Circles and Triangles (DOE Formative Assessment Task) 		
Arcs	10-1 Arcs and Sectors Pearson enVision pg. 419 - 426	<ul style="list-style-type: none"> Calculate the length of an arc when the central angle is given in degrees or radians. Calculate the area of sectors and segments of circles. 	C.2, C.5
	10-5 Secant Lines and Segments Pearson enVision pg. 451 - 458	<ul style="list-style-type: none"> Recognize and apply segment length relationships formed by secants and tangents intersecting inside and outside a circle. 	C.2
	Additional Resources: <ul style="list-style-type: none"> Arc Length and Area of a Sector (DOE Discovery Task) Guided Notes (from Pearson & Additional Resources) 		
3D Figures	11.1 Three-Dimensional Figures and Cross Sections Pearson enVision pg. 465 – 470	<ul style="list-style-type: none"> Use Euler’s Formula to calculate the number of vertices, faces, and edges in polyhedrons. Describe cross sections of polyhedrons. Describe rotations of polygons about an axis. Calculate density and population density 	GMD.4 G.MG.1
	11.2 Volumes of Prisms and Cylinders Pearson enVision pg. 470 – 478	<ul style="list-style-type: none"> Understand how the volume formulas for prisms and cylinders apply to oblique prisms and cylinders. Model three-dimensional figures as cylinders and prisms to solve problems. 	GMD.3

	3-Act Task Box ‘Em Up Pearson enVision pg. 479		
	11.3 Pyramids and Cones Pearson enVision pg. 480 – 486	<ul style="list-style-type: none"> ● Understand how the volume formulas for pyramids and ones apply to oblique pyramids and cones. ● Model three-dimensional figures as pyramids and cones to solve problems. 	GMD.1, GMD.2, GMD.3
	11.4 Spheres Pearson enVision pg. 487 - 492	<ul style="list-style-type: none"> ● Use Cavalieri’s Principle to show how the volume of a hemisphere is related to the volume of a cone and cylinder. ● Calculate volumes and surface areas of spheres and composite figures. 	GMD.3
	A Day at the Beach (DOE Task)	<ul style="list-style-type: none"> ● To visualize and identify the dimensions of geometric shapes ● To determine the volume relationships of cylinders, pyramids, cones, and spheres ● To justify geometric arguments 	G.MG.1 G.MG.3
Additional Resources: <ul style="list-style-type: none"> ● DOE Tasks: <ul style="list-style-type: none"> ● Tennis Balls in a Can ● Propane Tanks ● A Golden Crown ● Calculating Volume of Compound Objects ● How many Cells are in the Human Body ● Maximizing Volume 			

Personalized Learning and Differentiation

Teachers differentiate by providing examples (work samples or task-specific clarifications of assessment criteria); structuring support (advance organizers, flexible grouping, peer relationships); establishing flexible deadlines, and adjusting the pace.

- SWD/504- Accommodations provided
- ELL- Five Principle ELL Curriculum Framework and Vocabulary Supports
- Intervention Support- Re-teaching Activities in Small Groups with Progress Monitoring
- Extensions- Enrichment Tasks and Projects

Resources

DOE Curriculum Framework Tasks
 Savvas enVision Textbook and Pearson Realize Online Resources
 Link to Schoology Resources for Geometry PLC - <https://marietta.schoology.com/group/1985294869/materials#/group/1985294869/materials?f=83203532>